

Laboratory Review

①

1a

Step 1 Mass ~ 0.500 KHP. Record exact amount

2 dissolve ~~in~~ KHP in ~ 10.0 mL H_2O in 250. mL Flask. Add 2 drops Phenolphthalein soln to Flask

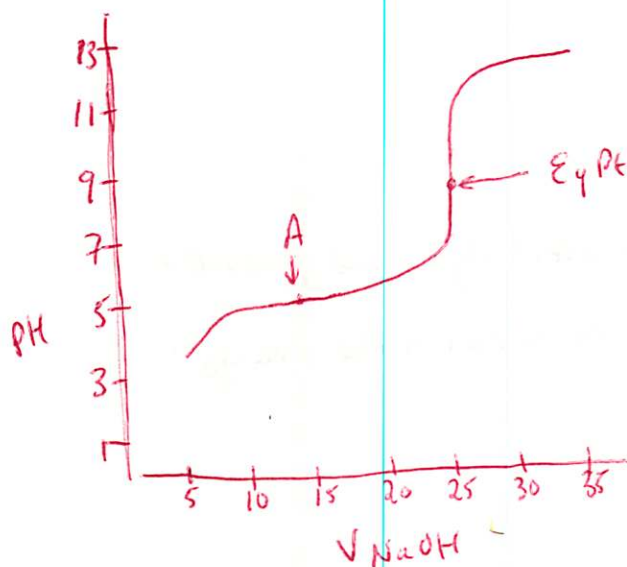
3. Setup Buret by first Rinsing 2x w/ 5 mL NaOH and then Filling Buret to 0.00 mL mark.

4. Add NaOH to Acid soln until a faint pink color persists for 30 - 40 seconds. If needed wash small drops of NaOH off of jet tip of Buret into flask.

5 Record the Final volume Reading on Buret when @ the End point of titration.

$$b \quad \text{Mass KHP} \times \frac{1 \text{ mol KHP}}{X \text{ g KHP}} \times \frac{1 \text{ mol NaOH}}{1 \text{ mol KHP}} = \frac{\text{mol NaOH used}}{(V_{f \text{ NaOH}} - V_{i \text{ NaOH}})} = M \text{ NaOH}$$

C.



d. K_a can be determined @ pt A on the curve. This is the $\frac{1}{2}$ Eq Pt and @ this point $pH = pK_a$.

e γ^{2-}

2 a $\text{Pb}(\text{NO}_3)_2$ According to the Eqn $\Delta T_b = i m K_b$
Since the value of i is 3 $\text{Pb}(\text{NO}_3)_2$ should have the highest Boiling point. The dissociations to 3 solute particles increase the B.P. more.

b $\text{KC}_2\text{H}_3\text{O}_2$ The acetate ion is a weak base so the ion will hydrolyze the H_2O



The OH^- ions in soln raise the p.H.

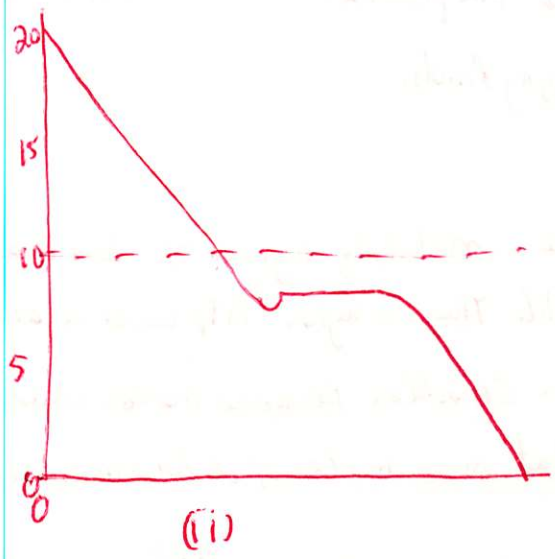
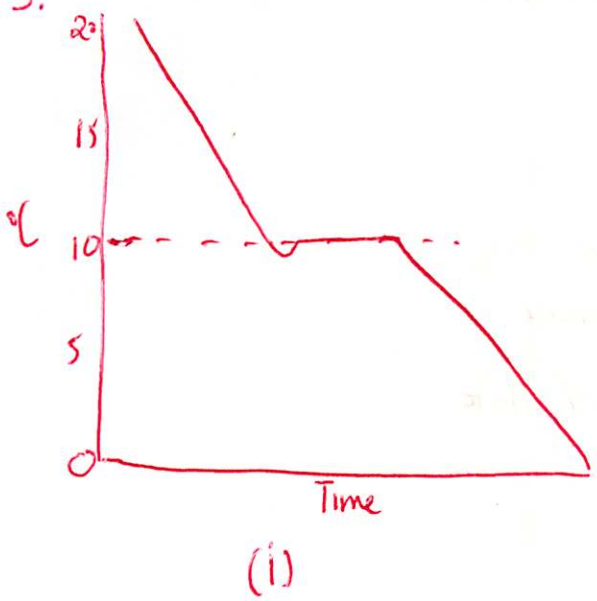
c $\text{Pb}(\text{NO}_3)_2 + \text{NaCl}$



d KMnO_4 , Cl_2

e $\text{C}_2\text{H}_5\text{OH}$ b/c ethanol is not an electrolyte and produces no ~~mobile~~ mobile ions in soln to carry the charge

3.



b i masses needed

- Mass of unknown solid used
- Mass of empty test tube
- mass of test tube w/ 10.0mL of solvent present.

Once solvent and solute are ~~compe~~ combined, they should be heated using the hot water bath. Once they reach a temp above 20°C they should be removed from the bath and allowed to cool in the ice bath. A thermometer should be placed ~~into~~ the test tube and the temp should be recorded every second until the bath reaches 0°C. This should also have been done for the pure solvent too. ~~Once the temp vs time data is graphed~~

ii

$$\Delta T_f = \text{Freezing Pt soln} - \text{Freezing Pt Pure solvent}$$

$$-(\Delta T_f) = i m K_f$$

solve for molality

once m known
solve for
Molar mass solute
by

$$m = \frac{\text{mass unknown solute}}{\text{Molar mass}}$$

solve for molar mass

$$\left(\left(\frac{\text{Mass test tube w/ - mass test tube}}{\text{initial solvent}} \right) \times \frac{1 \text{ Kg}}{1000 \text{ g}} \right)$$

iii The differences b/w the plateaus can be used to determine the difference in Freezing Points.

c It would make the molality higher b/c less mass of solute would be available. Thus a higher ΔT_f would be observed. This would result in a smaller recorded molar mass of solute b/c it would appear that more moles of it had been used.

$$m \uparrow = \frac{\text{mass solute}}{\text{molar mass solute} \times \text{kg solvent}}$$

$$d \quad \frac{(126 \text{ g} - 120 \text{ g})}{120 \text{ g}} \times 100\%$$

4 a

$$q = m c \Delta T$$

\uparrow \uparrow \uparrow \uparrow
 J g $\frac{J}{g^\circ C}$ $^\circ C$

b T_{initial} of HCl soln + NaOH solns

T_{final} of combined solution

Volume of each solution used

c

$$\frac{\text{Vol HCl used or NaOH}}{\text{same ES}} \times \frac{1 \text{ Mol HCl}}{1 \text{ L soln}} \times \frac{1 \text{ mol H}_2\text{O}}{1 \text{ mol HCl}} = \text{moles H}_2\text{O}$$

cii $q = \left((V_{\text{HCl}} + V_{\text{NaOH}}) \times \frac{1.00 \text{ g}}{1 \text{ mL}} \right) \left(4.18 \frac{\text{J}}{\text{g}^\circ\text{C}} \right) (T_f - T_i) = \text{heat produced}$

$$\frac{\left(\text{heat produced} \times \frac{1 \text{ kJ}}{1000 \text{ J}} \right)}{\left(\underset{\substack{\text{or} \\ V_{\text{NaOH}}}}{V_{\text{HCl}}} \times 1.0 \text{ M HCl} \right)} = \boxed{\Delta H_{\text{net}}}$$

d $q \uparrow$ b/c ^{2x the} ~~more~~ moles of each reactant will mean more energy is released so in $q = mc(\Delta T)$ ΔT will be larger.

b Stays the same b/c even though $q \uparrow$ the moles will increase proportionately keeping the same ΔH_{net} .

e This would make T_f smaller thus smaller q value and:

$$\frac{q \times \frac{1 \text{ kJ}}{1000 \text{ J}}}{\text{mol Reactants}} \downarrow = \boxed{\Delta H_{\text{net}}} \downarrow$$

5 a Molar Mass = $\frac{mRT}{PV}$

$$P_T = P_G - P_{\text{H}_2\text{O}}$$

b mass gas canister before > mass gas canister after > m

Look up $P_{\text{H}_2\text{O}}$ from table at given T

Temperature of H_2O > T

Use barometer to get Room P > P

Volume of gas in tube > V

c to make sure the pressure of the gas in the tube equals atmospheric pressure.

$$d \quad \frac{64g_{me} - 58g_{me}}{58g_{me}} \times 100\%$$

$$e \quad M = \frac{mRT}{PV}$$

↑

The water vapor pressure will make the pressure higher than the P of the dry gas alone. Thus you will divide by a ~~small~~ larger # and M goes down.